NAVSEA
STANDARD ITEM

FY-05

ITEM NO: 009-37
DATE: 29 AUG 2003
CATEGORY: II

1. SCOPE:

1.1 Title: General Procedures for Woodwork; accomplish

2. REFERENCES:

2.1 0900-LP-015-1010, Wood: A Manual for Its Use as a Shipbuilding Material, Volume I, Basic Wood Technology Applicable to Boat and Shipbuilding

2.2 0900-LP-015-1020, Wood: A Manual for Its Use as a Shipbuilding Material, Volume II, Techniques and Practices Applicable to Preservation and Storage

2.3 0900-LP-015-1030, Wood: A Manual for Its Use as a Shipbuilding Material, Volume III, Technical Data Applicable to Boat and Ship Design

2.4 0900-LP-015-1040, Wood: A Manual for Its Use as a Shipbuilding Material, Volume IV, Boat and Ship Construction Techniques

2.5 MIL-STD-1623, Fire Performance Requirements and Approved Specifications for Interior Finish Materials and Furnishings (Navy Shipboard Use)

3. REQUIREMENTS:

3.1 Accomplish the requirements of 2.1 through 2.4 for performing woodworking procedures.

3.2 Install flush fitted wood plugs/dowels in holes resulting from the removal of fasteners.

3.2.1 Where holes are to be reused and where subjected to stress or weight, plugs/dowels shall be set in a resorcinol adhesive conforming to MIL-A-22397.

3.2.2 Where holes are not to be reused, plugs/dowels shall be set in a NAVSEA approved natural bedding compound such as Interlux 214 or Dolchem 3400.

3.2.3 Where deterioration and decay exists around the perimeter of the fastener holes and where through-bolt holes have been elongated, enlarge the holes by drilling to a size (diameter) that will remove the deterioration, decay, and elongation, prior to installing plugs/dowels.

3.2.3.1 Clean-bore drill bit diameter shall not be more than one inch larger than the original fastener hole diameter, unless otherwise specified.

3.2.4 Plugs/dowels shall be of the same wood species as the member being repaired, with their grain installed parallel with the grain of the existing wood, and then driven the full depth of the hole being repaired.

3.2.5 Soak plugs/dowels for a minimum of 10 minutes and saturate the exposed fastener holes with wood preservative conforming to MIL-W-18142, Type A, and allow to dry for a minimum of 72 hours prior to installation of plugs/dowels.

3.3 Install new fasteners conforming to the following requirements, unless otherwise specified.

3.3.1 Fastener material composition requirements:

3.3.1.1 Nickel copper alloy conforming to QQ-N-281, Grades 400 or 405.

3.3.1.2 Nickel copper aluminum alloy conforming to QQ-N-286, Grade 500 (K-Monel) where greater strength is required.

3.3.1.3 Copper silicon alloy conforming to ASTM B98, Grades 651 or 655.

3.3.1.4 Corrosion resistant steel (CRES) conforming to ***SAE-AMS-STD-66***, Grades 304 or 316.

3.3.2 Fastener characteristics specifications:

3.3.2.1 Bolts, studs, and cap screws shall conform to MIL-DTL-1222.

3.3.2.2 Wood screws shall conform to FF-S-111.

3.3.2.3 Lag bolts (screws) shall conform to ASME B18.2.1.

3.3.2.4 Carriage bolts shall conform to ASME B18.5, Type I, Class One.

3.3.2.5 Nuts shall conform to MIL-DTL-1222.

3.3.2.6 Flat washers shall conform to FF-W-92, Grade I.

3.3.2.7 Lock washers shall conform to FF-W-100.

3.3.3 Fasteners subject to contact with sea water and bilge water shall be manufactured of the materials outlined in 3.3.1.1 through 3.3.1.3 and shall be coated with a light viscosity epoxy resin prior to installation.

3.3.3.1 Corrosion resistant steel (CRES), Grade 316, may be used as an alternative material substitute for the materials listed in 3.3.3 only if so specified in the Work Item.

3.3.4 Aluminum and aluminum alloy components and structural members shall be installed using CRES, Grade 304 or 316 fasteners.

3.3.4.1 Fasteners with compositions of copper alloys shall not be used in contact with aluminum and aluminum alloy components and structural members.

3.3.4.2 Install non-metallic (epoxy plastic, phenolic, polyimide [nylon], Teflon) sleeves over CRES fasteners where they come in contact with the aluminum and aluminum alloy components and structural members.

3.3.4.3 Install insulation tape, minimum thickness 20 mils, conforming to MIL-I-24391 (two thicknesses) between faying surfaces of aluminum/aluminum alloy-to-CRES to extend approximately 1/4-inch beyond the faying surfaces.

3.3.4.4 Ensure that the surfaces of aluminum and aluminum alloy components and structural members which will come in contact with wood members and CRES fasteners are protected with a minimum of two coats of epoxy polyimide primer conforming to MIL-DTL-24441.

3.3.4.5 Apply one coat of phenolic varnish conforming to A-A-1800 on wood members which will come in contact with aluminum and aluminum alloy components and structural members.

3.3.5 To avoid bimetallic corrosion, fastener material composition shall be the same material composition as that of the metal components and structural members that they are fastening except as noted in 3.3.4.

3.4 Accomplish installation of new fasteners as follows:

3.4.1 Drill pre-bored pilot holes for screws and fetter ring nails prior to installation to prevent damage to wood members.

3.4.1.1 Diameter of pilot holes shall not exceed 70 percent of the root diameter of screws for soft woods, and 90 percent for hard woods.

For screw shanks, the hole in the material to be fastened shall be 100 percent shank diameter.

3.4.1.2 Maximum depth of pilot holes shall not exceed 90 percent of the length of screws.

3.4.1.3 Holes for fetter ring nails shall be pre-bored not to exceed 60 percent of the nail diameter.

3.4.2 Screws shall not be impact driven. The last 1/4-inch of screws shall be hand-tightened.

3.4.2.1 Fasteners shall be set snug but not so tight as to weaken the material by rupture of wood fibers adjacent to the fasteners.

3.4.3 Bolt holes shall be drilled for a tight fit.

3.4.4 Where watertight integrity shall be maintained, the fasteners shall be body bound.

3.4.5 Through-bolts and hull plank fasteners shall be bedded in marine oakum conforming to T-O-56 or caulking cotton, and a NAVSEA approved natural bedding compound such as Interlux 214 or Dolchem 3400.

3.4.6 Counterbore wood fastener holes to permit the installation of a wood plug (bung) over the fasteners, unless otherwise specified. Install wood plugs over fasteners.

3.4.6.1 The depth of counterboring is fixed by the thickness of the planking, which in turn fixes the depth of the wood plug (bung) used. The depth (thickness) of a bung plug shall be one half to two thirds its diameter to ensure that it will stay in place. The rule for counterboring for bung plugs is that the plug diameter shall be no larger than necessary to allow the largest part of the fastener to enter the hole.

3.4.6.2 Plugs shall be of the same wood species as the member being plugged and their grain shall be installed parallel with the grain of the existing wood.

3.4.6.3 Soak plugs for a minimum of 10 minutes and saturate the fastener holes with wood preservative conforming to MIL-W-18142, Type A, and allow to dry for a minimum of 72 hours prior to installation of plugs.

3.4.6.4 Coat plugs on faying surfaces with a NAVSEA approved natural bedding compound such as Interlux 214 or Dolchem 3400, prior to installation and cut level and smooth with surrounding surfaces, unless otherwise specified.

3.5 New wood materials shall conform to the following requirements, unless otherwise specified.

3.5.1 Wood materials used for new interior finish materials and furnishings shall conform to the requirements of MIL-L-19140 and 2.5.

3.5.2 Types, grades, and species of wood (lumber) shall be as specified in the invoking Work Item.

3.5.3 Lumber shall conform to the specified grade after seasoning to the required moisture content and after being sized to the approximate dimensions of the members to be fashioned from it.

3.5.4 New wood members shall be finished smooth on each side.

3.5.5 Uncaulked seams, joints, and faying surfaces shall be fair and in continuous contact when assembled, except where specifically exempted, such as for hull sheathing.

3.5.6 New wood members, when assembled in place, shall show no rupture as a result of overstraining.

3.5.7 Laminated member construction shall conform to MIL-W-2038 for Douglas Fir and MIL-W-15154 for red or white oak.

3.5.7.1 When bonding together wood surfaces which rely on mechanical fastening for main strength, the adhesive shall conform to MIL-A-22397.

3.5.8 Plywood shall conform to MIL-P-18066, Class 3A.

3.5.9 Moisture content of new wood materials shall fall within the following parameters.

3.5.9.1 New lumber shall have a moisture content of 13 percent, plus or minus five percent, at the time of installation.

3.5.9.2 New plywood shall have a moisture content of 10 percent, plus or minus five percent, at the time of installation.

3.6 New lumber and plywood shall be soaked for 10 minutes in wood preservative after boring, shaping, and fairing operations have been completed.

3.6.1 Apply one soaking brush coat of wood preservative on bare wood surfaces exposed by removals and machining operations before surfaces are covered.

3.6.2 Wood preservative shall conform to MIL-W-18142, Type A, unless otherwise specified.

3.6.3 Allow preservative-treated wood to dry for a minimum of 72 hours prior to gluing and/or painting operations.

3.7 Apply a heavy coating of a NAVSEA approved natural bedding compound such as Interlux 214 or Dolchem 3400 on the top surfaces of deck beams, frames headers, fillers, planking side of frames, deck beam ends, seams, and butts (except those to be caulked), and other faying (joining) surfaces before the faying surfaces are covered, except as follows: In between inner and outer layers of hull planking of crafts that do not have caulking seams, a wood bedding/sealant compound conforming to 3M-5200 shall be installed.

3.7.1 Install one layer of canvas conforming to CCC-C-419, Type III (eight ounces or heavier) between faying surfaces of new leveling foundation pads installed on weather decks, in addition to a NAVSEA approved natural bedding compound such as Interlux 214 or Dolchem 3400.

3.7.2 Remove surplus bedding/sealing compound after squeeze-out.

3.8 No new butt joints shall be established in any planking strake (hull shell or deck) that will leave a portion that is less than 12 feet in length. No new portion of a planking strake shall be installed which is less than 12 feet in length.

3.8.1 Butt joints in adjacent strakes shall be separated by a minimum of three strakes.

3.8.2 Butt joints in the same frame space shall be separated by a minimum of three frame spaces.

3.8.3 Planking strakes may be scarf-joined to maintain butt joint schedule. Scarfing shall be in accordance with 2.1 through 2.4.

3.9 Wood members requiring caulking seams shall be installed with their faying surfaces tight and with an outgage (special bevel for caulking) in the side(s) to be caulked.

3.10 Accomplish the following work to ensure watertight integrity of caulked seams (including butt and rabbet seams).

3.10.1 Reef out by hand, defective caulking compound and loose and decayed caulking (cotton/oakum) from existing caulking seams requiring installation of new caulking and caulking compound.

3.10.1.1 Exercise care when reefing out caulking compound and caulking to preclude damage to existing caulking seams. Power tools shall not be utilized for the reefing out process.

3.10.2 Where existing caulking is found to be sound and in good condition, set the existing caulking deeper into the seam opening to ensure that it is driven solidly home and to make room for additional caulking.

3.10.2.1 Set the existing caulking by driving the caulking uniformly, to the same hardness in each seam. To prevent a wedging effect it shall be set to a hardness that would not allow an awl to penetrate more than 3/8-inch.

3.10.3 Caulking seams shall be clean and dry before installing new caulking and caulking compound.

3.10.4 Caulk deck planking caulking seams using treated caulking cotton and spun-type marine oakum conforming to T-O-56. Treat the caulking cotton as follows.

3.10.4.1 The untreated caulking cotton shall be undyed, of not less than 3/4-inch staple length, and shall be free from oil, fire-damaged or scorched cotton, added waste, and substantially free from linters.

3.10.4.2 The untreated caulking cotton shall be soft and fully opened and contain no sizing. The amount or size of specks shall not be objectionably noticeable upon casual examination.

3.10.4.3 The untreated caulking cotton shall be well carded to form a sliver and shall consist of not less than nine nor more than 12 slivers laid parallel to form a composite untwisted strand. Each sliver untreated shall measure approximately 500, plus or minus 50 feet, to the pound.

3.10.4.4 Treat the caulking cotton with a solvent solution of copper naphthenate-asphaltum to produce caulking cotton having a minimum of one percent metallic copper and 1-1/2 percent, plus or minus 1/2 percent, asphalt, based on the weight of the treated cotton. The copper shall be uniformly distributed throughout the cotton.

3.10.4.5 The treated caulking cotton shall be dry to the touch prior to installation.

3.10.5 Caulk hull shell planking caulking seams using treated caulking cotton conforming to the requirements outlined in 3.10.4.1 through 3.10.4.5 and spun-type marine oakum conforming to T-O-56.

3.10.5.1 Drive one to two strands of caulking cotton into the bottom of the seams, prior to installing marine oakum, to ensure that deep/tight seams are filled.

3.10.6 Caulking cotton and marine oakum caulking shall be looped, tucked, and hard-driven to a depth that provides space for installation of seam caulking compound.

3.10.6.1 The size of the seam in width and depth determines the required amount of cotton/oakum caulking and shall be filled to within 1/4-inch to 3/8-inch of the plank surface.

3.10.6.2 The amount of cotton/oakum caulking inserted shall be carefully controlled to limit the possibility to "caulk off" a plank from its frames if too much is driven in and forced beyond the outgage bevel.

3.10.6.3 The cotton/oakum caulking shall be driven uniformly, to the same hardness and depth in each seam, to prevent a wedging effect. It shall be set to a hardness that would not allow an awl to penetrate more than 3/8-inch.

3.10.6.4 Butt caulking seams shall be caulked ahead of adjoining longitudinal caulking seams to ensure that short ends of caulking will be locked in place.

3.10.6.5 The ends of sound existing caulking and new caulking shall be drawn out and tapered so as to be married in a continuous bulk and then be installed as stated in 3.10.6 through 3.10.6.4.

3.10.6.6 Caulking irons shall conform to GGG-I-671.

3.10.6.7 Hull shell planking caulking seams of heavy planked ships (e.g., MSOs) shall have the caulking set firmly home by means of a heavy horsing iron driven into the seams with a heavy mallet known as a beetle. This is a two-man operation that requires one man to hold the long-handled horsing iron while the second man swings the horsing beetle. This operation ensures that the caulking will be well seated, will not work loose, and is the final means to stiffen the hull.

3.10.7 Pay (fill) deck planking caulking seams with polyurethane caulking compound conforming to MIL-S-24340, Type I, Class 2, or marine glue MIL-G-413, Class 2, as specified in the invoking Work Item.

3.10.7.1 The depth of the seam caulking compound shall be one to 1-1/2 times the width of the seam but no deeper than 3/8-inch.

3.10.7.2 Seal the surfaces of the seams and the installed cotton caulking with a seam primer that is compatible with the caulking compound.

3.10.7.3 Install one-inch wide masking tape on both sides of each caulking seam to keep the caulking compound from penetrating the open grain areas of the deck planking.

3.10.7.4 Remove the tape installed in 3.10.7.3 upon completion of caulking operations.

3.10.8 Pay hull shell planking caulking seams with caulking compound in accordance with the following requirements.

3.10.8.1 Pay underwater hull caulking seams with Interlux 30 brown underwater seam compound (oleoresinous material cut with an aromatic solvent).

3.10.8.2 Pay hull caulking seams above the waterline with Interlux 31 white seam compound (oleoresinous material cut with an aromatic solvent).

3.10.8.3 The depth of the seam caulking compound shall be one to 1-1/2 times the width of the seam.

3.10.8.4 Paint the surfaces of the seams and the installed cotton/oakum caulking with anti-fouling paint conforming to Formula 121 of MIL-P-15931 prior to filling underwater hull shell planking seams with caulking compound.

3.10.8.5 Seal the surfaces of the seams and the installed cotton/oakum caulking with a seam primer that is compatible with the caulking compound on hull shell planking seams existing above the waterline.

3.10.9 Prior to paying the caulking compound installed in 3.10.7 and 3.10.8, seams shall be thoroughly cleared and cleaned of foreign matter.

3.10.9.1 The caulking compound may be applied with a caulking gun but shall be handworked into the seams to eliminate air pockets and voids in the seams.

3.10.9.2 Remove surplus caulking compound from surrounding surfaces.

3.10.9.3 Pay and complete seams daily, leaving no exposed cotton/oakum caulking at the end of each work shift to ensure the cotton/oakum caulking remains dry and clean.

3.10.9.4 When installing caulking compound and its compatible primer, the manufacturer's instructions shall be strictly adhered to. Seams greater than 1/2-inch width shall be payed in two applications spaced 24 hours apart.

3.11 Blank openings resulting from removals and relocations, unless otherwise specified, in accordance with the following.

3.11.1 Blank deck planking as follows:

3.11.1.1 Route a 3/8-inch deep indentation on both the top and underside of the deck planking, centered over the area to be blanked.

3.11.1.2 The routed area shall extend a minimum of three inches beyond the perimeter of the area to be blanked.

3.11.1.3 Fit and install a Douglas Fir insert in the area to be blanked.

3.11.1.4 Fit and install a 3/8-inch thick plywood insert in each routed-out indentation.

3.11.1.5 Bed faying surfaces of the inserts with a NAVSEA approved natural wood bedding compound such as Interlux 214 or Dolchem 3400, and secure with carriage bolts to ensure watertight integrity. Remove surplus wood bedding compound left after squeeze-out.

3.11.2 Blank plywood bulkheads and plywood decks as follows:

3.11.2.1 Enlarge the hole to be blanked to a minimum of four inches square.

3.11.2.2 Install a fitted plywood insert in the resulting opening in the deck or bulkhead.

3.11.2.3 Install a plywood lap cover on one side of and centered over the area to be blanked. The lap cover shall extend a minimum of three inches beyond the perimeter of the area to be blanked.

3.11.2.4 Bed faying surfaces of the insert and the lap cover in a NAVSEA approved natural wood bedding compound such as Interlux 214 or Dolchem 3400, and secure with carriage bolts to ensure watertight integrity. Remove surplus wood bedding compound left after squeeze-out.

3.11.3 Blank double-sheathed bulkheads as follows:

3.11.3.1 Enlarge the opening in the inner sheathing to a minimum of four inches square.

3.11.3.2 Enlarge the opening in the outer sheathing to a size that extends a minimum of three inches beyond the perimeter of enlarged inner sheathing opening.

3.11.3.3 Install a fitted plywood insert in each opening. The plywood inserts shall be the same thickness as the sheathing.

3.11.3.4 Install one layer of canvas conforming to ***PIA-C-419***, Type III (eight ounces or heavier), between the two inserts, the same size as the larger insert.

3.11.3.5 Bed faying surfaces of the inserts and the canvas in a NAVSEA approved natural wood bedding compound such as Interlux 214 or

Dolchem 3400, and secure with carriage bolts to ensure watertight integrity. Remove surplus wood bedding compound left after squeeze-out.

3.11.4 Sand new plywood blanks and disturbed surfaces to fair in with surrounding areas.

3.11.4.1 Apply one coat of ready-mixed aluminum paint conforming to TT-P-38, to sanded surfaces, followed by two coats of finish paint to match the surrounding areas.

4. NOTES:

4.1 None.